

# Central Alberta Recreational Lakes

## Science & Regulation 101

Revised: May 2013

# Introduction

- The purpose of the presentation:
  - To create a more widespread awareness and understanding of the science and regulations that are relevant to recreational lakes in Central Alberta
  - To foster behaviours that improve lake and watershed health



# The Issues

- There is an increasing pressure on lakes due to shoreline development, intensive land-use and increased recreational use
- Long-term human activity has caused a decrease in water quality
- Climatic variability also affects water quantity and quality





# **Changing Behaviours**

- Changing how we live or recreate around lakes is important as good practices will:
  - Safeguard water supplies
  - Maintain recreational opportunities
  - Reduce water borne health issues
  - Conserve habitat for plants and animals

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 Enhance value of property & overall enjoyment of lake



# Activities that could impact water quality

- Agriculture
- Contributions to climate change
- Cottage/acreage development
- Industry
- Recreational activities
- Sewage disposal systems
- Shoreline modification & treatments





# Science and Legislation

- The scientific study of lakes helps us assess lake conditions and monitor changes over time (Part 1 of presentation)
- Legislation helps us to manage activities around lakes in an agreed upon, legally binding way (Part 2 of presentation)



# Part 1: Understanding the Science of Lakes





# Water Quality

 There are many measures of lake water quality – the most common being trophic status (the biological productivity of a lake)

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- We can monitor:
  - 1. Physical indicators
  - 2. Chemical indicators
  - 3. Biological indicators
  - 4. Trophic Status



# 1. Physical measurements

- Water clarity is an important factor as plants need light to grow
- Murky water is usually related to high nutrient levels and high algae growth or excessive erosion or disturbance
- Most lakes in Central Alberta range from moderately clear to murky depending on season





- Water temperature changes with season & depth and can affect aquatic life and the metabolic activity of organisms
- Dissolved oxygen used by fish & aquatic organisms. Decomposition of algae or plant material can reduce O<sub>2</sub> levels to those that may cause fish kills
- As temperature increases the ability of water to hold oxygen decreases



# 2. Chemical measurements

- pH (acidic/basic) refers to the presence of hydrogen ions in the water – a healthy lake has a pH of 6.5 to 9
- Alkalinity refers to the amount of calcium carbonate in water – relates to the capacity of the lake to neutralize acid
- Conductivity/Salinity a measure of dissolved ions in water - changes may relate to alterations to lake water quantity and nutrient balances



# State of Lakes -Physical/Chemical measurements

 Relative to these measurements, most of the lakes in Central Alberta are shallow, turbid, warm, alkaline, productive and capable of supporting a variety of aquatic animals and plants





## 3. Biological Measurements

- Occasionally ESRD evaluates sediment and aquatic invertebrates in lakes to assess aquatic ecosystem health
- ESRD evaluates fish tissue contaminants in terms of possible effects to the growth and reproduction of the fish species
- Risk to human health as a result of consumption of tainted fish tissue is evaluated by the local health authority or Environment Canada

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- Fish population statistics are evaluated by ESRD
- Fish habitat requirements are assessed by the Department of Fisheries and Oceans
- Recreational health concerns are monitored by Alberta Heath (i.e. fecal coliforms and E.coli)
- Water used for livestock watering and irrigation is evaluated by Alberta Agriculture



# State of Lakes – Biological measurements

- Relative to human health factors, lakes in Central Alberta are generally safe for human recreational uses
- Bacteria, pesticides and metals are not routinely sampled in lakes and occur infrequently and at low concentrations where they have been measured
- Information on fish contaminates is not sufficient to assess trends or patterns
- Lake beach closures are rare in Central Alberta





# 4. Trophic Status

- Water quality is affected by both human activities and the natural attributes of a lake
- One measure of lake productivity or a lakes ability to support life is the trophic status:
  - Low productivity = oligotrophic lake
  - Moderate productivity = mesotrophic
  - High productivity = eutrophic
  - Very high productivity = hypereutrophic

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- While nutrients are needed by aquatic life, very high levels can negatively affect aquatic health and other uses of a lake
- Most common nutrients and indicators of lake productivity include:

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- Phosphorus: an essential nutrient that can limit the growth of algae and plants
- Chlorophyll a is a light gathering pigment that is common to all algae and plants
- Secchi depth measures the depth of light penetration



#### **Trophic State of Alberta Lakes**

#### Chlorophyll-a



Preliminary data



#### **Recreational Lake Productivity**

Mean Chla Concentration over monitoring record

Hypereutrophic

Eutro phic

- lake productivity varies in time and space
- difficult to separate between natural and human contributions

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#### Historic reconstructions of lake productivity

- Reconstructions of lake productivity in Central Alberta show that human settlement and land-use changes have increased nutrient and contaminant loading to lakes
- To date, these studies have been conducted on Isle Lake, St. Anne, Pine, Pigeon, Nakamun and Wabamun
- Water quality of most lakes likely deteriorated before our current monitoring programs started

http://environment.gov.ab.ca/info/library/7868.pdf

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# State of Lakes – Trophic Status

- The majority of our lakes are naturally productive (eutrophic) due to soil chemistry and geographical location:
  - Our lakes are naturally nutrient-rich, which means that they respond quickly to external nutrient inputs
  - Changes to a lake trophic state can alter the water quality and aquatic communities to less desirable states with decreased biodiversity



# State of Lakes – Trophic Status

- The most pronounced changes to water quality in central Alberta recreational lakes have already occurred due to changes in landuse
- Recent changes or trends in water quality deterioration are less pronounced and largely absent (1980 to present)
- We suggest adopting a "maintain or improve" approach to lake management



# Water Quantity

- Water levels have historically varied considerably due to fluctuations in precipitation and evaporation
- Lakes in Central Alberta are generally experiencing stable or decreasing water levels
- Of 41 Central Alberta lakes evaluated:
  - 44% had no trend
  - 51% had a decreasing trend
  - 5% had an increasing trend in water level







## Part 2: Understanding the Legislation of Lakes





# **Respect Our Lakes**

An education & extension program about lake & lakeshore values and regulatory requirements:

- A program designed by ESRD
- Promotes and encourages best management practices
- Increases knowledge of lake environments
- Increases awareness and understanding of the regulatory requirements and shared stewardship of Alberta lakes





# Legislation

Federal and Provincial legislation

 in place to manage and conserve our natural resources for the and for

#### **LEGISLATION AFFECTING WATER BODIES IN ALBERTA\***

# Legal Framework

Most commonly encountered legislation



Not all applicable legislation is depicted in the table, only the most commonly

encountered.



## Legal Framework Provincial (Alberta) Law

- Water Act
- Public Lands Act
- Surveys Act
- Municipal Government Act
- Safety Codes Act (Private Sewage Disposal System Reg. and Standard of Practice)
- Environmental Protection and Enhancement Act
- Public Health Act
- Weed Control Act
- Fisheries (Alberta) Amendment Act



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## Legal Framework Federal Law

- Fisheries Act
- Migratory Birds Convention Act
- Navigable Waters Protection Act
- Species at Risk Act



- Canada Shipping Act (Boating Restrictions Regulation & Pleasure Craft Sewage Pollution Prevention Regulation)
- Canadian Environmental Protection Act



#### Water Act

- Primary legislation dealing with water and its management
- Supports and promotes the conservation and management of water, including the wise allocation and use of water





#### Water Act

Relates to, but is not limited to, the following water bodies:

- Lakes
- Rivers
- Creeks
- Gullies
- Floodplains
- Wetlands
- Ponds, sloughs
- Bogs
- Muskeg
- Riparian areas
- Aquifers





#### Water Act

- ESRD is responsible under the Water Act for water management planning and decision making with respect to all waters in Alberta, including both surface and ground water - Sec. 3(2)
- Approvals and/or licenses are required for a wide range of activities (Sec. 36 and Sec. 49) such as:
  - Water diversion
  - Alteration/modification to a water body and bed or shore
  - Storm water management works
  - Aquatic vegetation control & removal
  - Activity that causes or may cause an adverse effect on the aquatic environment



#### Environmental Protection & Enhancement Act (EPEA)

- Prohibits the release of substances into the environment that may cause a significant adverse affect
- Also covers:
  - Pesticide regulation
  - Fertilizer storage and application
  - Storm water drainage systems
  - Municipal wastewater treatment facilities
  - Septage disposal
  - Waste minimization and management, i.e. waste on water/ice or public lands



#### **Public Lands Act**

- Primary legislation dealing with the bed and shore of water bodies and their management
- All bed and shores are owned by the Province, including Sec. 3:
  - Permanent and naturally occurring bodies of water (wetlands)
  - Naturally occurring rivers, streams, watercourses and lakes







## Public Lands Act - Section 54 (1)

No person shall do anything on public land that:

- May injuriously affect watershed capacity
- Is likely to result in injury to:
  - bed and shore of any river,
  - stream, watercourse, lake or
  - other body of water or land in the vicinity of that public land
- Is likely to result in soil erosion





#### **Property Boundaries**

- Most lakeshore properties do not extend to the water's edge
- Usually extend only to the "bank"
- A reserve may separate the property from the lake
- Reserves are owned and administered by the local municipality
- Check land title description, lot survey plan, or subdivision plan



NOTE: If reserve land separates your land from the lake, check with local government before doing any shoreline modification/activity

#### **Water Body Boundaries**



OHWM = Ordinary High Water Mark



# Effect of ordinary high water mark on natural vegetation



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#### "I own the property right to the water's edge"

- Vast majority of lakefront property owners <u>do not</u>
- Very few exceptions exist
- The land title and survey plan will state the extent of the property and its boundaries.
- It is the responsibility of a landowner to know where his/her property boundaries are.
- If the current location of a property boundary next to a water body needs to be established, the services of an Alberta Land Surveyor should be sought.
- Private shoreline ownership does not exempt the landowner from obtaining authorization for shoreline work





#### **Public Access on Provincial Shorelands**

- Where Albertans have legal access to a provincial water body, their right of access to and around a water body is not to be unreasonably restricted
- ESRD recognizes the importance of public access/passage, while still respecting landowner common law rights
- First Nations Indian Reserve Lands consult with First Nations before accessing shorelands



#### Authorization

- It is <u>everyone's responsibility</u> to be aware of the regulations before doing something that could affect the environment
- <u>Before starting</u> any project that may alter the shoreline area of a water body, you must contact the appropriate regulators for authorization



#### Authorization

- Written authority must be received from all applicable regulators before any activity is started
- A copy of the written authorization must be on the worksite with the contractor



#### **Use of Shorelands**

#### Examples of activities requiring authorization:

- Sand dumping, beach creation and/or maintenance
- Aquatic vegetation control and removal
- Boat lift, swimming dock or pier
- Septic/sewage systems
- Erosion protection works & other shoreline modifications
- Water diversion
- In-filling or re-grading
- Bottom dredging and excavation







#### **Beach Creation and Maintenance**

- Can be a form of "pollution"
- Can cover and destroy fish habitat
- Often encroaches onto Crown land
- Sand is easily eroded where there are no natural beaches
   i.e. "filling in" your lake
- Promotes shoreline alteration and increases risk of erosion
- Requires constant maintenance and money



Check with ESRD, local government and DFO if approval is required

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#### Beach Creation and Maintenance (continued)

- These may be permitted at public use areas:
  - beach renovation
  - on-going maintenance
  - aquatic vegetation control in designated swimming areas
- Provincial goal:
  - redirect public activity to common community areas



 Reduce the cumulative impact of many individual shore modifications

Check with ESRD, local government, and DFO if approval is required

## **Aquatic Vegetation Control & Removal**

- Cumulative impact contributes to loss of fish and bird habitat, loss of fish productivity, increased erosion potential, and increase in nutrients = more algae
- Generally approvals are limited to mechanical cutting, to a max. 4m width, and stands that cover less than 75% must remain intact
- Larger areas may be approved for public use areas (e.g. common beach & swimming areas)





Check with ESRD, local government and DFO if approval is required

## Boat lift, Swimming raft, Dock, or Pier

- Seasonal & Temporary
  - Exempted from ESRD approval if:
    - Removed completely from lake by end of the open water season
    - Non-commercial use
    - Water can flow freely underneath
    - Does not interfere with the public's right of access
    - Not restricted by local or federal government environmentally sensitive areas or management plans, and
- - Does not increase probability of shore erosion

Check with ESRD, local government, DFO, and Transport Canada if approval is required

### Boat lift, Swimming raft, Dock, or Pier

- Commercial and/or Permanent
  - Requires an approval
    - not issued to individuals
    - may be issued to commercial or government groups



Check with ESRD, local government, DFO, and Transport Canada if approval is required

## Septic/Sewage Systems

- If your home is not connected to a municipal sewer system, you must have a private sewage disposal system
- The system must be installed and maintained to the standard set by Alberta Municipal Affairs
- Routine Maintenance is required!
- Distance setbacks apply from the property line, building, and from water sources/courses, e.g.:
  - Water-tight septic tanks 10m
  - Sub-surface treatment fields 15m
  - Treatment mounds 15m
  - Open discharge systems 45-50m
  - Sewage lagoon (single dwelling) 90m



#### Contact your local government and Alberta Municipal Affairs for permits

#### **Erosion Protection Works**

- Naturally occurring vegetation found on the shoreline dampens wave energy and can even protect against ice scouring.
- When riparian vegetation is cut or removed, erosion increases.

#### "Soft" armoring

(e.g. plants) maintains wildlife habitat, reduces sediment, filters run-off, and protects water quality



"Hard" armoring (e.g. rocks) is only approved in situations where erosion risk is very high

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Check with ESRD, local government, DFO and Transport Canada if approval is required

#### Water Diversion

- Landowners adjacent to (bordering) a water body are exempt from approval to divert up to:
  - 1250 m3/year for household purposes
  - 6250 m3/year for agricultural purposes (if owned prior to 1999)
- Diversion <u>over this limit requires</u>
   <u>a license</u>
- If a water supply line and/or pump disturbs the bed and shore of a water body, approval must be obtained prior to installation



#### Check with ESRD if approval is required

#### **Off Highway Vehicles on Shorelands**

- Cause nuisance/noise, public safety, erosion, wildlife/livestock harassment, habitat loss, etc.
- Is a "community" issue too as lakeshore ATV users are often local residents



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- Need for residents to apply peer pressure
- ESRD promotes responsible use, consideration of neighbors, safety, and conservation of shoreland resources
- Generally occurs on vacant Crown land currently can only enforce traffic violations or damages if caught in act
- Current ESRD legislation is under review
- Some seasonal sanctuaries exist to protect and assist in recovery of Endangered Species (e.g. Piping plover nesting areas)



## **Approval Process**

- ESRD Application form
- Submit a copy to:
  - Regional Approvals Center
  - Need to submit background information, e.g. plan location and cross-section drawing of land, etc.
  - if a lakeshore activity has the potential to impact a FN's Indian reserve lands, then AENV will work with the applicant to notify the appropriate FN's and provide direction and guidance on how to proceed.

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#### **Approval Process** SAMPLE BANK STABALIZATION (1) CROSS SECTION A-A Subdivision Plan 187 MC Block 7 Lot 1 (TOWNSHIP 56, RANGE 2, WEST 5 MERIDIAN) 0 Sylvan Lake (South east Quarter of Section 34) SAMPLE Lot 1 orth and south Reserve 0 3.2 Metres APEA : 8,883 ha A See Detail -**Existing Condition** Normal lake level 0.5 Metres (Show present level also, 0.4 Metres f different than "normal" 5115 A.E. level) Lot 1 Reserve A' 0.6m 2.7 Metres A Maximum Lake Level 12 DETAIL Bank of Sylvan Lake (7) 0.1m Present Lake Level Proposed Condition (After Construction) 0.4m 0.2m Filter Cloth Minimum Lake Level Rock Riprap Laver A' ① PLAN SHOWING LOCATION OF OFFICE USE ONLY Land to be Rock Riprap BANK STABILIZATION Removed Note : Existing Bank to be sloped to 3H;1V; Pit run gravel to be distributed in large rock; material will be free of clay, silt, sand and Vegetation/topsoil. Filter Cloth ③ Plan 5189HW, Block 4. Lot 10 SW5, TWP 37, RGE 14, W5 Lake Bed (1) Pion Prepared For : JOHN SMITH (2) PLAN PREPARED FOR : Distances are in matres PLAN PREPARED BY : DISTANCES IN METRES FILE #: APPLICATION/FINAL PLAN

PLAN PREPARED FOR : PLAN PREPARED BY : FILE #



#### Compliance

- Regulators assess non-compliance
- Aim to work with those in non-compliance to achieve compliance
- Under the *Public Lands Act* and *Water Act* 
  - Failure to obtain approval is subject to administrative penalties
  - Administrative penalties for unauthorized use (\$5,000 for each day or part day)
  - Activities that cause or have potential to cause injury or an adverse effect to the bed and shore and/or water are offences
  - Enforcements could include prosecution
  - Court penalties for offences:
    - PLA (\$25,000 for individual, \$100,000 for corporation) WA (\$50,000 for individual, \$500,000 for corporation)
  - Compensation for loss of Crown's property



#### For more information:

- ESRD web site: http://environment.alberta.ca
- CARL Sharepoint:

https://external.sp.environment.gov.ab.ca/CR-R ecLakes/default.aspx

- Respect Our Lakes site: <u>http://environment.alberta.ca/03036.html</u>
- ESRD Info Centre: 1-780-427-2700
- Alberta Environmental Hotline:
   **1-800-222-6514**



#### You can also contact:

- Spruce Grove Office
   Suite 1, 250 Diamond Avenue
   Main Switchboard: (780) 960-8600
- Red Deer Office

304, 4920 – 51 Street

- Main Switchboard: (403) 340-7052

Government

of Alberta

